Addendum #1 to
Mt. Ashland Late-Successional Reserve
Habitat Restoration and Fuels Reduction Project
Cumulative Watershed Effects Analysis
Specialist Report
For the FEIS Preferred Alternative and No Action + Wildfire

Cumulative Watershed Effects (CWE) Quantitative Models for
Surface Erosion, Mass-wasting, and ERA/TOC

By
Gregg Bousfield
Don Elder
Tom Laurent
1/10/2008

General:

This report represents an addendum to the *Mt. Ashland Late-Successional Reserve Habitat Restoration and Fuels Reduction Project Cumulative Watershed Effects Analysis Specialist Report* (July 20, 2006). Only the Preferred Alternative and No Action + Wildfire are discussed herein. Please refer to previous report of July 20, 2006 for general CWE model information and discussion of other Alternatives.

When comparing the Preferred Alternative with Alternative 2 (Proposed Action), general differences can be summarized as follows: (1) The Preferred Alternative represents a reduction in temporary spur road construction, from 6.72 miles (21 roads) to 1.70 miles (8 roads), (2) The Preferred Alternative decreases construction of log landings, from 25 acres to 22 acres, and (3) The Preferred Alternative increases treatment acreage from 4,706 acres to 5,765 acres. As expressed in CWE model numbers, the reduction is spur road construction is approximately offset by the new landing construction. Proposed increase in treated acreage (~ 1,000 more acres) explains the general increase in model values for the Preferred Alternative compared to Alternative 2.

The No Action + Wildfire Alternative was a scenario that analyzed the effects of a wildfire given the present fuel loading conditions. The results from the fire behavior model (FFE FVS) used in the FEIS were applied to the units proposed for treatment. The rest of the 7th and 5th field watershed acres were not modeled for wildfire; therefore, the full impact of a wildfire (acres burned) was not modeled.

Summary of Findings:

Prior to implementation of the Alternatives, the models (as shown in 'Current' section of spreadsheet *ALT5m_cwe_sheds_ashland_12dec07.xls*) indicate that of the thirteen (13) 7th-field drainages within the analysis area:

[1] Six (6) drainages [Beaver/Dutch Creek, Hungry Creek, Jaynes Canyon, Lower West Fork Beaver Creek and Upper West Fork Beaver Creek] have elevated **USLE model** (surface erosion) values, with values greater than the USLE inference point (risk ratio greater than 1.0).

[2] Four (4) drainages [Beaver/Grouse Creek, Hungry Creek, Long John Creek and Soda-Bumblebee] have elevated **GEO model** (mass wasting) values, with values greater than the GEO inference point (risk ratio greater than 1.0).

[3] Three (3) drainages [Jaynes Canyon, Lower West Fork Beaver Creek, and Upper West Fork Beaver Creek] have elevated **ERA/TOC** values, with values greater than the TOC (risk ratio greater than 1.0).

Prior to implementation of the Preferred Alternative, Beaver Creek 5th-field watershed has elevated values for one of the three models, with USLE = **1.16**. After implementation of the Preferred Alternative, model values indicate watershed risk is slightly increased or decreased for the Beaver Creek 5th-field watershed; USLE (surface erosion) = **1.18** ('risk ratio'- slightly increased from prior to the Preferred Alternative)**,** GEO (mass wasting) **= 0.90** ('risk ratio' – slightly decreased from prior to the Preferred Alternative), and ERA/TOC **= 0.83** ('risk ratio' – slightly increased from prior to the Preferred Alternative).

With the No Action + Wildfire Alternative, all model values indicate watershed risk is increased for the Beaver Creek 5th-field watershed; USLE (surface erosion) = **1.46** ('risk ratio' – increased by 0.29 from prior to No Action + Wildfire Alternative)**,** GEO (mass wasting) **= 0.96** ('risk ratio' – slightly increased from prior to No Action + Wildfire Alternative), and ERA/TOC **= 0.82** ('risk ratio' – slightly increased from prior to No Action + Wildfire Alternative).

The North Klamath THP, considered a future foreseeable action, slightly increased the risk ratio for ERA by 0.02 at the Beaver Creek 5th-field watershed. The North Klamath THP slightly increased the risk ratios for USLE and GEO by 0.01 at the Beaver Creek 5th-field watershed.

The Mt Ashland LSR project proposed action lies within six (6) 7th-field drainages – Headwaters Cottonwood Creek, Beaver/Grouse Creek, Deer-Beaver Creek, Hungry Creek, Long John Creek, and Upper Cow Creek. After implementation of the Alternatives 5 Modified and No Action + Wildfire, changes in model values are shown in the following tables.

The **USLE** model values for these drainages are as follows (**bold** denotes elevated values or risk ratio above model inference point):

Alternative	7th-field Drainage	Current	With Alternative	With Alternative + Future Actions
No Action + Wildfire	Headwaters Cottonwood Creek	.41	.43	.43
No Action + Wildfire	Beaver/Grouse Creek	.94	**2.63**	**2.63**
No Action + Wildfire	Deer-Beaver Creek	.93	**1.06**	**1.07**
No Action + Wildfire	Hungry Creek	**1.34**	**1.34**	**1.34**
No Action + Wildfire	Long John Creek	.88	**2.03**	**2.03**
No Action + Wildfire	Upper Cow Creek	.66	.70	.70
2	Headwaters Cottonwood Creek	.41	.41	.41
2	Beaver/Grouse Creek	.94	.98	.98
2	Deer-Beaver Creek	.93	.95	.96
2	Hungry Creek	**1.34**	**1.34**	**1.34**
2	Long John Creek	.88	.97	.97
2	Upper Cow Creek	.66	.67	.67
3	Headwaters Cottonwood Creek	.41	.41	.41
3	Beaver/Grouse Creek	.94	.98	.98
3	Deer-Beaver Creek	.93	.95	.95
3	Hungry Creek	**1.34**	**1.34**	**1.34**
3	Long John Creek	.88	.95	.95
3	Upper Cow Creek	.66	.66	.66
4	Headwaters Cottonwood Creek	.41	.41	.41
4	Beaver/Grouse Creek	.94	.99	.99
4	Deer-Beaver Creek	.93	.95	.96
4	Hungry Creek	**1.34**	**1.34**	**1.34**
4	Long John Creek	.88	.97	.97
4	Upper Cow Creek	.66	.67	.67
5	Headwaters Cottonwood Creek	.41	.42	.42
5	Beaver/Grouse Creek	.94	.99	.99
5	Deer-Beaver Creek	.93	.95	.96
5	Hungry Creek	**1.34**	**1.34**	**1.34**
5	Long John Creek	.88	.96	.96
5	Upper Cow Creek	.66	.66	.66
5M (Preferred Alternative)	Headwaters Cottonwood Creek	.41	.42	.42
5M (Preferred Alternative)	Beaver/Grouse Creek	.94	**1.03**	**1.03**
5M (Preferred Alternative)	Deer-Beaver Creek	.93	**1.01**	**1.02**
5M (Preferred Alternative)	Hungry Creek	**1.34**	**1.34**	**1.34**
5M (Preferred Alternative)	Long John Creek	.88	.98	.98
5M (Preferred Alternative)	Upper Cow Creek	.66	.66	.66

The **GEO** model values for these drainages are as follows (**bold** denotes elevated values or risk ratio above model inference point):

Alternative	7th-field Drainage	Current	With Alternative	With Alternative + Future Actions
No Action + Wildfire	Headwaters Cottonwood Creek	.86	.86	.86
No Action + Wildfire	Beaver/Grouse Creek	**1.47**	**2.06**	**2.06**
No Action + Wildfire	Deer-Beaver Creek	.87	.87	.89
No Action + Wildfire	Hungry Creek	**1.80**	**1.80**	**1.80**
No Action + Wildfire	Long John Creek	**1.42**	**1.74**	**1.74**
No Action + Wildfire	Upper Cow Creek	.49	.50	.50
2	Headwaters Cottonwood Creek	.86	.86	.86
2	Beaver/Grouse Creek	**1.47**	**1.45**	**1.45**
2	Deer-Beaver Creek	.87	.86	.88
2	Hungry Creek	**1.80**	**1.80**	**1.80**
2	Long John Creek	**1.42**	**1.37**	**1.37**
2	Upper Cow Creek	.49	.49	.49
3	Headwaters Cottonwood Creek	.86	.86	.86
3	Beaver/Grouse Creek	**1.47**	**1.46**	**1.46**
3	Deer-Beaver Creek	.87	.86	.88
3	Hungry Creek	**1.80**	**1.80**	**1.80**
3	Long John Creek	**1.42**	**1.37**	**1.37**
3	Upper Cow Creek	.49	.49	.49
4	Headwaters Cottonwood Creek	.86	.86	.86
4	Beaver/Grouse Creek	**1.47**	**1.46**	**1.46**
4	Deer-Beaver Creek	.87	.86	.88
4	Hungry Creek	**1.80**	**1.80**	**1.80**
4	Long John Creek	**1.42**	**1.39**	**1.39**
4	Upper Cow Creek	.49	.49	.49
5	Headwaters Cottonwood Creek	.86	.86	.86
5	Beaver/Grouse Creek	**1.47**	**1.47**	**1.46**
5	Deer-Beaver Creek	.87	.86	.88
5	Hungry Creek	**1.80**	**1.80**	**1.80**
5	Long John Creek	**1.42**	**1.37**	**1.37**
5	Upper Cow Creek	.49	.49	.49
5M (Preferred Alternative)	Headwaters Cottonwood Creek	.86	.86	.86
5M (Preferred Alternative)	Beaver/Grouse Creek	**1.47**	**1.45**	**1.45**
5M (Preferred Alternative)	Deer-Beaver Creek	.87	.87	.89
5M (Preferred Alternative)	Hungry Creek	**1.80**	**1.80**	**1.80**
5M (Preferred Alternative)	Long John Creek	**1.42**	**1.37**	**1.37**
5M (Preferred Alternative)	Upper Cow Creek	.49	.49	.49

The **ERA/TOC** model values for these drainages are as follows (**bold** denotes elevated values or risk ratio above model inference point):

Alternative	7th-field Drainage	Current	With Alternative	With Alternative + Future Actions
No Action + Wildfire	Headwaters Cottonwood Creek	.26	.26	.26
No Action + Wildfire	Beaver/Grouse Creek	.53	.80	.80
No Action + Wildfire	Deer-Beaver Creek	.69	.69	.71
No Action + Wildfire	Hungry Creek	.78	.78	.78
No Action + Wildfire	Long John Creek	.38	.60	.60
No Action + Wildfire	Upper Cow Creek	.31	.32	.32
2	Headwaters Cottonwood Creek	.26	.32	.32
2	Beaver/Grouse Creek	.53	.78	.78
2	Deer-Beaver Creek	.69	.81	.83
2	Hungry Creek	.78	.78	.78
2	Long John Creek	.38	.74	.74
2	Upper Cow Creek	.31	.34	.34
3	Headwaters Cottonwood Creek	.26	.32	.32
3	Beaver/Grouse Creek	.53	.75	.75
3	Deer-Beaver Creek	.69	.80	.82
3	Hungry Creek	.78	.78	.78
3	Long John Creek	.38	.72	.72
3	Upper Cow Creek	.31	.32	.32
4	Headwaters Cottonwood Creek	.26	.32	.32
4	Beaver/Grouse Creek	.53	.74	.74
4	Deer-Beaver Creek	.69	.81	.83
4	Hungry Creek	.78	.78	.78
4	Long John Creek	.38	.68	.68
4	Upper Cow Creek	.31	.33	.33
5	Headwaters Cottonwood Creek	.26	.32	.32
5	Beaver/Grouse Creek	.53	.76	.76
5	Deer-Beaver Creek	.69	.80	.82
5	Hungry Creek	.78	.78	.78
5	Long John Creek	.38	.73	.73
5	Upper Cow Creek	.31	.33	.33
5M (Preferred Alternative)	Headwaters Cottonwood Creek	.26	.32	.32
5M (Preferred Alternative)	Beaver/Grouse Creek	.53	.79	.79
5M (Preferred Alternative)	Deer-Beaver Creek	.69	.84	.86
5M (Preferred Alternative)	Hungry Creek	.78	.78	.78
5M (Preferred Alternative)	Long John Creek	.38	.76	.76
5M (Preferred Alternative)	Upper Cow Creek	.31	.33	.33

Information used in this assessment:

'Current [past & present]' section lists model output results from past and present activities. Information from many sources was combined. Past logging activities from Forest Service (FS) administered lands was obtained from the Forest's managed stands layer (<mgstands>). Managed stands layer was integrated with "recent" and "present" FS projects within the analysis area. See discussion below for more details ('Arc/Info coverages' section).

Harvest activities on private land were captured from DOQs (Digital Orthoquad) and recent THPs (Timber Harvest Plan). See Table A (*ALT 2,3,4,5 cwe_sheds_ashland_12dec07.xls*) for details. Thirteen (13) THPs were digitized and included for this project. They were: [1] Charles Lake THP (1998), [2] Wards Gap THP (1999), [3] Bull-Schneider THP (2000), [4] Jaynes Canyon THP (2000), [5] Beaver Creek THP (2001), [6] North Bear THP (2001), [7] Swayback THP (2001), [8] Hungry Parrot (2003), [9] Dead Cow THP (2004), [10] Deer Dog THP (2004), [11] Bear Trapper THP (2004), [12] Beaver THP (2004), [13] Sterling THP (2004) and [14] 1907 Summit THP (2005). The last four THPs were digitized as part of this project. These activities are shown in Table A as 'past and current private harvest' and XXX THP in 'Name' column. Some additional private roads were added from these THPs.

Effects from Crest, Beaver and Uptown proposed actions were not modeled, as these projects have been withdrawn. Modeled effects from Tennis Thin project are included

In 2005, additional 'unauthorized' roads (formerly referred to as 'unclassified' or 'non-system' roads) and existing "temporary" roads were mapped in association with this project. These roads were captured in GIS coverages by Richard Van de Water and transferred to the roads layer used in this analysis. Road attributes were reviewed by Leslie Burkhart and incorporated in this analysis.

'Proposed Action' section exhibits model results for proposed project activities:

Information used for this proposed action was provided in Arc/Info GIS coverages entitled <units_alt5M> (12-12-2007 version) and <underburn> (12-12-2007 version). These coverages were copied from "K:\gis\project\eis\scott_river\mt_ashland\activities" workspace. Unit attribute information (silvicultural prescription, logging system and post-logging fuel/site prep treatments) were obtained from spreadsheet entitled "Modified_Alt5_UPDATED_WITH_FUELS_YARDING_120707.xls" (12-7-07 version) and from coverage attributes. See Table C (*ALT5m_ cwe_sheds_ashland_12dec07.xls*) for project parameters used in this analysis.

For modeling purposes, the following assumptions were made:

1. For units described as "Handpile/underburn" in 'Fuels Treatment' column, 'underburn' was assumed,
2. For units described as "Mastication/HP" in 'Fuels Treatment' column, 'mastication' was assumed,
3. Units described as "CGB" (combined ground-based) in 'Logging System' column were modeled using coefficients for 'tractor' logging system,
4. Units described as "TE" (tractor end-line) in 'Logging System' column were modeled using coefficients for 'cable' logging system.

With the possible exception of "TE," these assumptions are conservative, in that they tend to over-model CWEs.

Proposed new landing construction is from points coverage <landings>, copied from workspace "K:/gis/project/eis/scott_river/mt_ashland/activities" (12-6-2007 version). These points were buffered to create circles using the following dimensions:

Type of landing	Buffer radius, in meters	Acres, approximate
Potential helicopter service	36	1.0
Potential helicopter log	36	1.0
Potential cable/skyline log	25	0.25-0.5
Potential tractor log	25	0.5

Locations of these landings are for modeling purposes only and may change during project implementation. Existing landings were not modeled.

Proposed construction of new temporary spur roads was incorporated from coverage <temp_roads>, copied from "K:/gis/project/eis/scott_river/mt_ashland/trans" workspace (11-27-2007 version). It is assumed that these roads will be hydrologically stabilized (decommissioned) after use. Existing unauthorized roads associated with the project were modeled from coverage <project_rds>, copied from "K:/gis/project/eis/scott_river/mt_ashland/trans" workspace (7-17-06 version). These roads will be opened, used during the project, hydrologically stabilized after use and closed.

Proposed new construction of temporary spur roads and landings, and treatments of existing unauthorized roads used in the project vary by action alternative. Details for the Preferred Alternative are shown in accompanying spreadsheet called, *ALT5m_cwe_roads_ashland_12dec07.xls*.

'No Action + Wildfire' section exhibits model results for No-action Wildfire Alternative

Burn severity was determined using the fire behavior model (FFE FVS) results as documented in the FEIS. The fire behavior model gave outputs of vegetation consumption and fire behavior characteristics under the 90th percentile conditions for the areas proposed for treatment in the Preferred Alternative. The Forest Soil Scientist converted these outputs into soil burn severity classes (High, Moderate and Low) based on the post-fire condition of the forest canopy. High soil burn severity occurs when the forest canopy is completely consumed resulting in no post-fire litter fall (needle cast). Moderate soil burn severity occurs when the forest canopy is scorched (brown) but not consumed resulting in post-fire needle cast. Low soil burn severity occurs when the forest canopy is basically left intact with some scorching of the lower branches resulting in increased post-fire needle cast of brown and green needles. The distribution of High, Moderate and Low soil burn severity was a combination of data from past wildfires and the fire type used in the FFE FVS model.

The three models were then run using the same cover coefficients used for past wildfires. Details for the Preferred Alternative are shown in accompanying spreadsheet called, *NoAction_Wildfire_ashland_10jan08.xls*. See Table D for acreages of High, Moderate, and Low burn severity by 7th field watersheds.

'No Action + Wildfire [reasonable foreseeable]'

The North Klamath THP was modeled as a future action (see Table A for details).

References (not all cited):

Amaranthus, Michael P., Raymond M. Rice, Nicholas R. Barr, and Robert Ziemer, 1985, *Logging and Forest Roads Related to Increased Debris Slides in Southwest Oregon*: Journal of Forestry, v. 83, no. 4, p. 229-233.

De la Fuente, Juan, and Don Elder, 1998, *The Flood of 1997: Klamath National Forest Phase I Final Report*: USDA Forest Service, Klamath National Forest, Yreka, CA

de la Fuente, Juan & Polly Haessig, 1994, *Salmon Sub-basin Sediment Analysis*: USDA Forest Service, Klamath National Forest, Yreka, CA.

MacDonald, Lee H., 2000, *Evaluating and Managing Cumulative Effects: Process and Constraints*: Environmental Management, v. 26, no. 3, p. 299-315.

USDA Forest Service (USFS), 1988, *R-5 FSH 2509.22 – Soil and water Conservation Handbook*: USDA Forest Service, Pacific Southwest Region, San Francisco, CA., section 23.62.

USDA Forest Service (USFS), 1989, *Grider Fire Recovery Project, Final Environmental Impact Statement*: USDA Forest Service, Klamath National Forest, Yreka, CA.

USDA Forest Service (USFS), 1994a, *Land and Resource Management Plan – Klamath National Forest*: USDA Forest Service, Klamath National Forest, Yreka, CA.

USDA Forest Service (USFS), 1995a, *Record of Decision for the Final Environmental Impact Statement for the Klamath National Forest*: USDA Forest Service, Klamath National Forest, Yreka, CA.

USDA Forest Service (USFS), 1998a, *Cumulative Watershed Effects from Three Models Applied to 249 Seventh-field Watersheds on the Westside of the Klamath National Forest*: Don Elder (author), unpublished, USDA Forest Service, Klamath National Forest, Yreka, CA.

USDA Forest Service (USFS), 1998b, *Evaluation of Cumulative Watershed Conditions in Indian Creek – Validation of Areas with Watershed Concerns*: unpublished, USDA Forest Service, Klamath National Forest, Yreka, CA.

USDA Forest Service (USFS), 1996, *Beaver Creek Ecosystem Analysis:* USDA Forest Service, Klamath National Forest, Oak Knoll Ranger District, Klamath River, CA.

USDA Forest Service (USFS), 2002, *Horse Creek Ecosystem Analysis:* USDA Forest Service, Klamath National Forest, Scott River Ranger District, Fort Jones, CA.

USDA Forest Service (USFS), 2004, *CWE 2004 - Cumulative Watershed Effects Analysis*: Don Elder and Mark Reichert (authors), unpublished, February 9, 2004, USDA Forest Service, Klamath National Forest, Yreka, CA.